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| EXAMINER | |
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| BAND, MICHAEL A | |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| *Office Action Summary* | **Application No.** 10/573,942 | **Applicant(s)** SATO ET AL. | |
|---|---|---|---|
| | **Examiner** MICHAEL BAND | **Art Unit** 1723 | |

***-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --***

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *11/2/2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 March 2006* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *10/18/2010*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

## DETAILED ACTION

### *Withdrawal of Finality*

1. Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive due to the reference Kools et al (USPGPub 2004/0137158) not clearly teaching using a gas cluster ion beam at additional angles besides the exemplary angle of 0°.

### *Response to Arguments*

2. Applicant's arguments, see 4th Interview Summary dated 11/2/2010 after Final Rejection dated 7/8/2010, with respect to the rejection(s) of claim(s) 1-8 under 103 have been fully considered and are persuasive for the reasons given above in the Withdrawal of Finality. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is now made in view of Kitani, Hoehn et al, Kools et al, and Morimoto in addition to Matsukawa et al from Applicant's newly submitted IDS filed 10/18/2010.

### *Information Disclosure Statement*

3. The Applicant is reminded of his or her obligation and duty to disclose information relevant to patentability according to MPEP 704.12(a), which includes US Patents, USPGPubs, and non-patent literature naming the inventor or inventors of the current application which have not been disclosed in an IDS form, such as USPGPub

2010/0230616 (i.e. PCT/JP2007/071460) and published International Search Report for PCT/JP2007/071460.

4. The information disclosure statement filed 3/26/2009 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; **each non-patent literature publication** (emphasis added) or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. The non-patent literature however had been considered since a Google Scholar search was utilized using the particular non-patent literature titles.

### *Specification*

5. The title of the invention is not descriptive since an apparatus is no longer claimed. A new title is required that is clearly indicative of the invention to which the claims are directed.

### *Drawings*

6. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: [24a], [24b], [22b]. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet,

even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### *Claim Rejections - 35 USC § 112*

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 4-8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 4-5 contain the requirement the plane of projection. It is unclear as to what defines the plane of projection. For examination purposes, the plane of projection has been interpreted as the plane of the substrate surface on which the beam irradiates.

Claims 4-5 recite the limitation "the plane of projection" or “said plane of projection”. There is insufficient antecedent basis for this limitation in the claim.

### *Claim Rejections - 35 USC § 102*

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

10. Claim 1 is rejected under 35 U.S.C. 102(a) as being anticipated by Hiramoto et al (WO 03/001614), equivalent to Matsukawa et al (US 2004/0086752) cited below.

With respect to claim 1, Matsukawa et al discloses surface roughness can be suppressed (i.e. smoothed) on a semiconductor substrate with ion milling at a low angle or irradiating with a gas cluster ion beam, where the irradiating may be performed so that an angle of incidence of the ion beam at the surface is 5° to 25° and is capable of having an angle of incidence between 0° and 90° (p. 1, para 0005; p. 3, para 0034).

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

12. Claim 1 rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Kitani (*Incident Angle Dependence of the Sputtering Effect of Ar-cluster Ion Bombardment*).

With respect to claim 1, Kitani discloses gas cluster ions impacting a solid surface for smoothing using several different incident angles (abstract). Kitani further discloses that incident angles from 0° to 60° (i.e. 90° to 30° angle formed between surface and ion beam) were tried, measured from the surface normal (i.e. perpendicular to the surface) of a semiconductor substrate (p. 490, left column). Kitani also discloses that larger angles than 45° can be used since the desired smoothing effect is dependent

on the incident angle (p. 491, right column), thus the angle used for the smoothing is a result-effective variable, with it being held that a particular parameter must first be recognized as a result-effective variable, i.e. a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. see MPEP 2144.05, Section II, Part B.

13. Claim 1 rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Hoehn et al (US 2002/0001680).

With respect to claim 1, Hoehn et al discloses using a beam generator to break molecular bonds on a semiconductor substrate (abstract; p. 3, para 0026), where figs. 2-4 depicts the beam generator [250] breaking said molecular bonds to smooth into a single molecular layer. Fig. 3 also depicts the beam generator operating [250] at an angle [θ] formed between a solid surface [202] and said ion beam generator being between 25° and 75°, where said beam generator [250] is a gas cluster ion beam using argon gas (para 0041-0042; claim 6). Since it has been held that where the claimed range (i.e. less than 30°) 'overlap or lie inside ranges disclosed by the prior art (i.e. 25° to 75°)' a *prima facie* case of obviousness exists. see MPEP 2144.05, Section I. Therefore it is either inherent or obvious that Hoehn et al discloses using a gas cluster ion beam at an angle formed between the solid surface [202] and the ion beam generator [250] less than 30° (i.e. between 25° and 29°).

## ***Claim Rejections - 35 USC § 103***

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

15. Claims 2-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiramoto et al (WO 03/001614), equivalent to Matsukawa et al (US 2004/0086752) cited below as applied to claim 1 above, and further in view Dykstra et al (US Patent No. 6,624,081).

With respect to claims 2-8, the reference is cited as discussed for claim 1. However Matsukawa et al is limited in that varying the angles of the gas cluster ion beam is not suggested.

Dykstra et al teaches enhanced etching/smoothing of a surface of a semiconductor substrate via gas cluster ion beam (GCIB) (abstract), where the ion beam is composed of argon gas (col. 5, lines 4-5). Figs. 3-4 depict a scanning system [47] to uniformly scan in a scanning pattern (i.e. repeating scan one or more times) the GCIB across large areas to produce spatially homogenous results (col. 5, lines 40-49). Dykstra et al further teaches the GCIB initially directed along a preselected axis where said GCIB is directed offset from the preselected axis (abstract), where fig. 4 depicts a fixed offset angle [68] between the preselected axis and total scanning GCIB [65]. Dykstra et al also teaches that while an example of the offset angle [68] is 15° from the

preselected axis (i.e. GCIB hits the substrate [41] at an angle of 75°), other larger angles than 15° may be used (col. 7, lines 29-36).

It would have been obvious to one of ordinary skill to incorporate scanning at different angles as taught by Dykstra et al for the scanning at a single angle of Matsukawa et al to gain the advantage of producing spatially homogenous results.

Regarding claims 2-3, the combination of references teach smoothing at an initial angle of 5° to 25° and capable of smoothing up to an angle of 90° (Matsukawa reference) and then scanning 15° from said initial angle to a different angle (Dykstra et al reference). Therefore it is obvious that the combination of references teach irradiating at an angle of 40° prior to then scanning at the initial fixed angle of 25° to result in the scanning pattern.

Regarding claims 4-8, the combination of references also teach irradiating at a first direction angle of 5° to 25° to the substrate surface (i.e. plane of projection) (Matsukawa reference) and scanning 15° (Dykstra et al reference) to a second direction to an angle of 10° to 20° to said substrate surface to result in the scanning pattern where said first and second directions form an angle greater than 5°. It is well known that a semiconductor surface comprises features such as trenches.

16. Claims 2-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiramoto et al (WO 03/001614), equivalent to Matsukawa et al (US 2004/0086752) cited below) as applied to claim 1 above, and further in view Erickson et al (US Patent No. 7,064,927).

With respect to claims 2-8, the reference is cited as discussed for claim 1. However Matsukawa et al is limited in that varying the angles of the gas cluster ion beam is not suggested.

Erickson et al teaches a method of smoothing a semiconductor substrate via beam of gas clusters to remove asperities (abstract), where the gas cluster beam is composed of an inert gas such as argon (col. 5, lines 16-27). Fig. 4 depicts the gas cluster ion beam [64] impacting the semiconductor substrate [52] by sweeping at different trajectories that can be repeated (i.e. sweeping pattern) (col. 5, lines 55-67; col. 6, lines 1-2). Fig. 4 also depicts that the gas cluster ion beam [64] is projected at an initial incident angle of 0°, where the trajectories of said gas cluster ion beam [64] appear to be swept at a different angle less than 90°. Erickson et al cites the advantages of using the gas cluster ion beam at different trajectories as smoothing laterally without appreciable subsurface damage by removing surface roughness or asperities in addition to removing pits or crevices (col. 6, lines 15-18).

It would have been obvious to one of ordinary skill to sweep the gas cluster beam at different trajectories repeatedly as taught by Erickson et al for the single trajectory of Matsukawa et al to gain the advantages of smoothing laterally without appreciable subsurface damage by removing surface roughness or asperities in addition to removing pits or crevices.

Regarding claims 2-3, the combination of references teach smoothing at an initial angle of 5° to 25° and capable of smoothing up to an angle of 90° (Matsukawa reference) and then sweeping across different trajectories (i.e. angles) to a different

angle, (Erickson et al reference). Therefore it is obvious that the combination of references teach irradiating at an angle of 40° prior to then sweeping at the initial fixed angle of 5°-25° to result in the sweeping pattern.

Regarding claims 4-8, the combination of references also teach irradiating at a first direction angle of 5° to 25° to the substrate surface (i.e. plane of projection) (Matsukawa reference) and sweeping to a different (i.e. second) direction (Erickson et al reference) angle of 30° or less to said substrate surface to result in the sweeping pattern where said first and second directions form an angle greater than 5°. It is well known that a semiconductor surface comprises features such as trenches.

17. Claims 2-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kitani (*Incident Angle Dependence of the Sputtering Effect of Ar-cluster Ion Bombardment*) as applied to claim 1 above, and further in view of Dykstra et al (US Patent No. 6,624,081).

With respect to claims 2-8, the reference is cited as discussed for claim 1. However Kitani is limited in that varying the angles of the gas cluster ion beam is not suggested.

Dykstra et al teaches enhanced etching/smoothing of a surface of a semiconductor substrate via gas cluster ion beam (GCIB) (abstract), where the ion beam is composed of argon gas (col. 5, lines 4-5). Figs. 3-4 depict a scanning system [47] to uniformly scan in a scanning pattern (i.e. repeating scan one or more times) the GCIB across large areas to produce spatially homogenous results (col. 5, lines 40-49). Dykstra et al further teaches the GCIB initially directed along a preselected axis where

said GCIB is directed offset from the preselected axis (abstract), where fig. 4 depicts a fixed offset angle [68] between the preselected axis and total scanning GCIB [65]. Dykstra et al also teaches that while an example of the offset angle [68] is 15° from the preselected axis (i.e. GCIB hits the substrate [41] at an angle of 75°), other larger angles than 15° may be used (col. 7, lines 29-36).

It would have been obvious to one of ordinary skill to incorporate scanning at different angles as taught by Dykstra et al for the scanning at a single angle of Kitani to gain the advantage of producing spatially homogenous results.

Regarding claims 2-3, the combination of references teach smoothing at an initial angle between of 90-30° (Kitani reference) and then scanning 15° from said initial angle to a different angle (Dykstra et al reference). Therefore it is obvious that the combination of references teach irradiating at an angle of 40° prior to then scanning at the initial fixed angle of 25° to result in the scanning pattern. Therefore it is obvious that the combination of references teach irradiating at an angle of approximately 45° prior to then scanning at the initial fixed angle of approximately 30° to result in the scanning pattern.

Regarding claims 4-8, the combination of references also teach irradiating at an angle approximately 30° by initially irradiating in a first direction at an angle of 30° to the substrate surface (i.e. plane of projection) (Kitani reference) and scanning 15° (Dykstra et al reference) to a second direction to an angle of 15° to said substrate surface to result in the scanning pattern where said first and second directions form an angle

greater than 5°. It is well known that a semiconductor surface comprises features such as trenches.

18. Claims 2-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kitani (*Incident Angle Dependence of the Sputtering Effect of Ar-cluster Ion Bombardment*) as applied to claim 1 above, and further in view of Erickson et al (US Patent No. 7,064,927).

With respect to claims 2-8, the reference is cited as discussed for claim 1. However Kitani is limited in that varying the angles of the gas cluster ion beam is not suggested.

Erickson et al teaches a method of smoothing a semiconductor substrate via beam of gas clusters to remove asperities (abstract), where the gas cluster beam is composed of an inert gas such as argon (col. 5, lines 16-27). Fig. 4 depicts the gas cluster ion beam [64] impacting the semiconductor substrate [52] by sweeping at different trajectories that can be repeated (i.e. sweeping pattern) (col. 5, lines 55-67; col. 6, lines 1-2). Fig. 4 also depicts that the gas cluster ion beam [64] is projected at an initial incident angle of 0°, where the trajectories of said gas cluster ion beam [64] appear to be swept at a different angle less than 90°. Erickson et al cites the advantages of using the gas cluster ion beam at different trajectories as smoothing laterally without appreciable subsurface damage by removing surface roughness or asperities in addition to removing pits or crevices (col. 6, lines 15-18).

It would have been obvious to one of ordinary skill to sweep the gas cluster beam at different trajectories repeatedly as taught by Erickson et al for the single trajectory of

Kitani to gain the advantages of smoothing laterally without appreciable subsurface damage by removing surface roughness or asperities in addition to removing pits or crevices.

Regarding claims 2-3, the combination of references teach smoothing at an initial angle between of 90-30° (Kitani reference) and then sweeping across different trajectories (i.e. angles) to a different angle, (Erickson et al reference). Therefore it is obvious that the combination of references teach irradiating at an angle of 45° prior to then sweeping at the initial fixed angle of 30° to result in the sweeping pattern.

Regarding claims 4-8, the combination of references also teach irradiating at a first direction angle of 30° to the substrate surface (i.e. plane of projection) (Kitani reference) and sweeping to a different (i.e. second) direction (Erickson et al reference) angle of 30° or less to said substrate surface to result in the sweeping pattern where said first and second directions form an angle greater than 5°. It is well known that a semiconductor surface comprises features such as trenches.

19. Claims 2-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoehn et al (USPGPub 2002/001680) as applied to claim 1 above, and further in view of Dykstra et al (US Patent No. 6,624,081).

With respect to claims 2-8, the reference is cited as discussed for claim 1. However Hoehn et al is limited in that varying the angles of the gas cluster ion beam is not suggested.

Dykstra et al teaches enhanced etching/smoothing of a surface of a semiconductor substrate via gas cluster ion beam (GCIB) (abstract), where the ion

beam is composed of argon gas (col. 5, lines 4-5). Figs. 3-4 depict a scanning system [47] to uniformly scan in a scanning pattern (i.e. repeating scan one or more times) the GCIB across large areas to produce spatially homogenous results (col. 5, lines 40-49). Dykstra et al further teaches the GCIB initially directed along a preselected axis where said GCIB is directed offset from the preselected axis (abstract), where fig. 4 depicts a fixed offset angle [68] between the preselected axis and total scanning GCIB [65]. Dykstra et al also teaches that while an example of the offset angle [68] is 15° from the preselected axis (i.e. GCIB hits the substrate [41] at an angle of 75°), other larger angles than 15° may be used (col. 7, lines 29-36).

It would have been obvious to one of ordinary skill to incorporate scanning at different angles as taught by Dykstra et al for the scanning at a single angle of Hoehn et al et al to gain the advantage of producing spatially homogenous results.

Regarding claims 2-3, the combination of references teach smoothing at an initial angle of 25° to 75° (Hoehn et al reference) and then scanning 15° from said initial angle to a different angle (Dykstra et al reference). Therefore it is obvious that the combination of references teach irradiating at an angle of 40° prior to then scanning at the initial fixed angle of 25° to result in the scanning pattern.

Regarding claims 4-8, the combination of references also teach irradiating at a first direction at an angle of 25° to the substrate surface (i.e. plane of projection) (Hoen et al reference) and scanning 15° (Dykstra et al reference) to a second direction to an angle of 10° to said substrate surface to result in the scanning pattern where said first

and second directions form an angle greater than 5°. It is well known that a semiconductor surface comprises features such as trenches.

20. Claims 2-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoehn et al (USPGPub 2002/001680) as applied to claim 1 above, and further in view of Erickson et al (US Patent No. 7,064,927).

With respect to claims 2-8, the reference is cited as discussed for claim 1. However Hoehn et al is limited in that varying the angles of the gas cluster ion beam is not suggested.

Erickson et al teaches a method of smoothing a semiconductor substrate via beam of gas clusters to remove asperities (abstract), where the gas cluster beam is composed of an inert gas such as argon (col. 5, lines 16-27). Fig. 4 depicts the gas cluster ion beam [64] impacting the semiconductor substrate [52] by sweeping at different trajectories that can be repeated (col. 5, lines 55-67; col. 6, lines 1-2). Fig. 4 also depicts that the gas cluster ion beam [64] is projected at an initial incident angle of 0°, where the trajectories of said gas cluster ion beam [64] appear to be swept at a different angle less than 90°. Erickson et al cites the advantages of using the gas cluster ion beam at different trajectories as smoothing laterally without appreciable subsurface damage by removing surface roughness or asperities in addition to removing pits or crevices (col. 6, lines 15-18).

It would have been obvious to one of ordinary skill to sweep the gas cluster beam at different trajectories repeatedly as taught by Erickson et al for the single trajectory of Matsukawa et al to gain the advantages of smoothing laterally without appreciable

subsurface damage by removing surface roughness or asperities in addition to removing pits or crevices.

Regarding claims 2-3, the combination of references teach smoothing at an initial angle of 25° to 75° (Hoehn reference) and then sweeping across different trajectories (i.e. angles) to a different angle, (Erickson et al reference). Therefore it is obvious that the combination of references teach irradiating at an angle range of approximately 30°-40° prior to then sweeping at the initial fixed angle of 25° to result in the sweeping pattern.

Regarding claims 4-8, the combination of references also teach irradiating at a first direction angle of 29° to the substrate surface (i.e. plane of projection) (Hoehn reference) and sweeping to a different (i.e. second) direction (Erickson et al reference) angle of 25° to said substrate surface to result in the sweeping pattern where said first and second directions form an angle greater than 5°. It is well known that a semiconductor surface comprises features such as trenches.

## ***Conclusion***

21. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. KR 2006036660 as being relevant to the state of the art.

22. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Band whose telephone number is (571) 272-9815. The examiner can normally be reached on Mon-Fri, 9am-5pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on (571) 272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

23. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. B./

Examiner, Art Unit 1723

/Alexa D. Neckel/

Supervisory Patent Examiner, Art Unit 1723